AMENDMENTS TO THE CLAIMS

1. (Original) A method of polarization-scrambling an incoming optical signal, comprising the steps of:

causing a variation of the state of polarization (SOP) as a function of time for an incoming optical signal that has an unknown SOP to produce a polarization-scrambled optical signal; and

periodically changing said SOP of said polarization-scrambled optical signal with time, such that said periodically changing polarization-scrambled optical signal covers approximately an entire Poincaré sphere surface during each time period of said periodic changing.

2. (Original) The method of claim 1 wherein said SOP of said periodically changing polarization-scrambled optical signal is distributed substantially uniformly over said entire Poincaré sphere surface during each said time period.

3. (Original) The method of claim 1 further comprising the steps of:

propagating said periodically changing polarization-scrambled optical signal through a fiber-optic transmission link that contains polarization dependent loss (PDL);

producing a periodic variation as a function of time of the optical signal power of said polarization-scrambled optical signal propagating through said fiber-optic transmission link; and

measuring said optical signal power variation in real time.

4. (Original) The method of claim 3 wherein said real-time measured optical signal power variation is selected from the group consisting of peak-to-peak optical signal power variation and root-mean-square optical signal power variation.

5. (Original) The method of claim 3 wherein said optical signal power variation is measured using a photo-detector.

6. (Original) The method of claim 3 wherein said fiber-optic transmission link contains at least one component selected from the group consisting of optical fibers and optical amplifiers.

7. (Original) An optical apparatus, comprising:

a first optical polarization controller having an input port operable to receive an input optical signal having a polarization state, said first optical polarization controller being operable to adjust the polarization state of said input optical signal to produce a first intermediate optical signal;

a first optical element coupled to said first polarization controller and operable to receive and to cause a fixed polarization dependent loss (PDL) in said first intermediate optical signal to produce a second intermediate optical signal;

a second optical polarization controller coupled to said first optical element, said second optical polarization controller being operable to adjust the polarization state of said second intermediate optical signal to produce a third intermediate optical signal; and

a second optical element substantially identical to said first optical element, said second optical element being operable to receive and to cause a fixed polarization dependent loss (PDL) in said third intermediate optical signal to produce an output optical signal.

8. (Original) The optical apparatus of claim 7 having adjustable polarization dependent loss (PDL).

9. (Original) The optical apparatus of claim 8 operable as a PDL compensator.

10. (Original) A method for real-time compensation of the performance degrading effect induced by polarization dependent loss (PDL) in a multi-wavelength fiber-optic communication system including at least one adjustable polarization controller, said method comprising the steps of:

transmitting a continuous-wave ancillary wavelength substantially central relative to a plurality of data-modulated wavelengths through said communication system together with said plurality of data-modulated wavelengths, said continuous-wave ancillary wavelength having an unknown state of polarization (SOP);

scrambling the SOP in said continuous-wave ancillary wavelength periodically in time;

monitoring in real time the instantaneous value said PDL in said continuous-wave ancillary wavelength; and

adjusting said at least one adjustable polarization controller in response to said real-time monitored instantaneous PDL value.

11. (Original) The method of claim 10 wherein said step of scrambling further comprises the steps of:

causing a variation of the SOP as a function of time in said continuous-wave ancillary wavelength to produce a polarization-scrambled continuous-wave ancillary wavelength; and

periodically changing said SOP of said polarization-scrambled continuous-wave ancillary wavelength with time, such that said periodically changing polarization-scrambled continuous-wave ancillary wavelength covers approximately an entire Poincaré sphere surface during each time period of said periodic changing.

12. (Original) The method of claim 11 wherein said SOP of said periodically changing polarization-scrambled continuous-wave ancillary wavelength is distributed substantially uniformly over said entire Poincaré sphere surface during each said time period.

13. (Original) The method of claim 11 wherein said step of monitoring further comprises the steps of:

propagating said periodically changing polarization-scrambled continuous-wave ancillary wavelength through a fiber-optic transmission link that contains polarization dependent loss (PDL);

producing a periodic variation as a function of time of the optical signal power of said polarization-scrambled continuous-wave ancillary wavelength propagating through said fiber-optic transmission link; and

measuring said optical signal power variation in real time.

14. (Original) The method of claim 13 wherein said real-time measured optical signal power variation is selected from the group consisting of peak-to-peak optical signal power variation and root-mean-square optical signal power variation.

15. (Original) The method of claim 13 wherein said optical signal power variation is measured using a photo-detector.

16. (Original) The method of claim 13 wherein said fiber-optic transmission link contains at least one component selected from the group consisting of optical fibers and optical amplifiers.

17. (Original) The method of claim 13 wherein said continuous-wave ancillary wavelength together with said plurality of data-modulated wavelengths propagate through a fiber-optic transmission link comprising at least two optical transmission fibers coupled optically in series through at least one optical node, wherein said at least one node contains:

a first optical polarization controller having an input port operable to receive an input optical signal having a polarization state, said first optical polarization controller being operable to adjust the polarization state of said input optical signal to produce a first intermediate optical signal;

a first optical element coupled to said first polarization controller and operable to receive and to cause a fixed polarization dependent loss (PDL) in said first intermediate optical signal to produce a second intermediate optical signal;

a second optical polarization controller coupled to said first optical element, said second optical polarization controller being operable to adjust the polarization state of said second intermediate optical signal to produce a third intermediate optical signal; and

a second optical element substantially identical to said first optical element, said second optical element being operable to receive and to cause a fixed polarization dependent loss (PDL) in said third intermediate optical signal to produce an output optical signal.

18. (Original) The method of claim 17 wherein said at least one optical node has an adjustable PDL.

19. (Original) The method of claim 18 wherein said step of adjusting further comprises adjusting said first and second polarization controllers in said at least one optical node to minimize said real-time monitored value of PDL.

20. (Original) A system for real-time compensation of the performance degrading effect induced by polarization dependent loss (PDL) in a multi-wavelength fiber-optic communication system, said system comprising:

a first optical polarization controller having an input port operable to receive an input optical signal having a polarization state, said first optical polarization controller being operable to adjust the polarization state of said input optical signal to produce a first intermediate optical signal;

a first optical element coupled to said first polarization controller and operable to receive and to cause a fixed polarization dependent loss (PDL) in said first intermediate optical signal to produce a second intermediate optical signal;

a second optical polarization controller coupled to said first optical element, said second optical polarization controller being operable to adjust the polarization state of said second intermediate optical signal to produce a third intermediate optical signal; and

a second optical element substantially identical to said first optical element, said second optical element being operable to receive and to cause a fixed polarization dependent loss (PDL) in said third intermediate optical signal to produce an output optical signal.

21. (Original) The system of claim 20 having adjustable PDL.

22. (Original) The system of claim 20 further comprising a recirculating optical loop.